CLAIMS

1. A method for preparing an electrically conductive polymeric article, comprising

i) contacting a polymeric material capable of exhibiting electrical conductivity upon oxidative doping with a viologen salt to form a pre-doped composition; and

irradiating the pre-doped composition with electromagnetic radiation, thus producing an electrically conductive polymeric material.

2. The method according to claim 1, wherein the electromagnetic radiation is of one or more UV or near UV wavelengths.

3. The method according to claim 1 or 2, wherein the viologen salt is deposited on a suitable substrate.

4. The method according to claim 3, wherein the viologen salt is grafted onto a suitable substrate utilizing a heat and/or UV-induced treatment.

5. The method according to claim 3, wherein the viologen salt is formed in situ in contact with the polymer.

6. The method according to claim 1, wherein a surface of the viologen-bearing substrate is partially or completely coated with the polymeric material.

7. The method according to claim 1 wherein the polymer is contacted with the viologen by forming a coating or film of the polymeric material in situ.

8. The method according to claim 1 wherein a coating of the polymeric material is deposited on a suitable substrate.

9. The method according to claim 8, wherein the viologen salt is deposited on the polymer coated substrate.

10. The method according to claim 1, wherein a mixture of viologen salts is used.

11. The method according to claim 1 wherein at least one of the 1,1'-substituents of the viologen are independently selected from an alkyl group or a benzyl group.

12. The method according to claim 1 wherein the viologen salt is a polymeric viologen salt.

13. The method according to claim 12, wherein the viologen moiety is present in the backbone of the polymer.

14. The method according to claim 12, wherein the viologen moiety is present as a side chain of the polymer.

15. The method according to claim 1, wherein the viologen salt is a viologen dihalide.

16. The method according to claim 13, wherein the viologen salt is a viologen dihalide.

17. The method according to claim 1 or 2 wherein the polymeric material is polyaniline, a polyaniline derivative, polypyrrole, a polypyrrole derivative or a mixture of at least two compounds selected from the group consisting of a polyaniline, a polyaniline derivative, a polypyrrole and a polypyrrole derivative.

18. The method according to claim 1 wherein the resistance of the polymeric material is reduced by approximately 3 to 6 orders of magnitude within a period of 3 hours or less.

19. The method according to claim 1, wherein the method is conducted at a temperature of 0°C to approximately 80°C in the presence of air and in the absence of any solvent.

20. The method according to claim 1 or 2 wherein the polymeric material is formed by a method comprising:

a) providing a low density polyethylene film substrate; a solution of aniline or

pyrrole; ammonium persulfate; and a vinyl alkyl halide or vinyl benzyl halide;

b) immersing the polyethylene film substrate into the solution of aniline or pyrrole and ammonium persulfate for a period sufficient to form a polymeric coating on the substrate;

c) contacting the coated substrate with the vinyl alkyl halide or vinyl benzyl halide;

d) subjecting the mixture to UV or near UV irradiation for a time sufficient to form a vinyl alkyl halide grafted substrate.

21. The method according to claim 20 wherein vinyl benzyl halide is used.

22. A method for producing an electrically conductive polymer comprising:

i) providing

a vinyl alkyl halide grafted low density polyethylene film substrate;

an alkyl halide; and

4,4'-bipyridine;

ii) contacting the grafted film substrate with the 4,4'-bipyridine for a time sufficient to permit reaction therebetween;

iii) subsequently contacting the modified grafted film substrate with the alkyl halide for a time sufficient to permit the formation of a viologen grafted film; and

iv) irradiating the viologen grafted film with UV or near UV light;

thereby obtaining an electrically conductive polymer.

23. An electrically conductive polymeric article prepared according to the method of claim 1 or 22.

24. An electrically conductive article comprising at least one polymer and at least one viologen salt.

25. The electrically conductive article according to claim 23, wherein the viologen salt is a polymer.

26. The electrically conductive polymeric article according to claim 23 wherein the polymer comprises polyaniline or a polyaniline derivative.

27. The electrically conductive polymeric article according to claim 24 wherein the polymer comprises polyaniline or a polyaniline derivative.

28. The electrically conductive polymeric article according to claim 23, wherein the polymer is polypyrrole or a polypyrrole derivative.

29. The electrically conductive polymeric article according to claim 23 wherein the polymeric material is polyaniline.

30. The electrically conductive polymeric article according to claim 23 wherein the polymeric material is polypyrrole.

31. The electrically conductive polymeric article according to claim 23, wherein the polyaniline starting material has an oxidation state between the leucoemeraldine (0% oxidized) and the nigraniline (75% oxidized) state.

32. The electrically conductive polymeric article according to claim 23, wherein the polymeric material is in the form of a film, film coating, or powder.

33. The electrically conductive polymeric article according to claim 23 having a pattern of electrically conductive portions and electrically non-conductive portions.